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JUNIOR HIGH-SCHOOL MATHEMATICS IN TRENTON.

By Louise Northwood.

The junior school movement in mathematics, as we see it in Trenton, emphasizes the necessity for, first, a much more simple program below the seventh grade, second, more thorough drill in fundamentals and third, definite testing to determine results.

To meet this we have aimed to make our work less inclusive and more intensive. Up to date the work has been largely experimental. We are at present working on a course of what we call mimimal essentials and with that as a framework we will build what we hope will be that which we need.

As you well know we have three grades, seventh, eighth, and ninth, to consider and also a further division because of ultimate aims of pupils in each grade. Differentiation we must have, for we want to consider very definitely the needs of that child who must leave early and take his place in the industrial world and, from a different angle, to consider the one who knows college awaits him beyond high school. A constant question in our mind has been, "Just what does each child need?" We do not in any sense feel we have entirely solved the problem, but of this we are sure, both groups must be accurate and have ability to do with as much speed as possible the four fundamentals, fractions and decimals. Business men tell us there is very little beyond this of absolute necessity.

On the day school opened, October 30, we gave to every child in the school an arithmetic test including five examples in each of the fundamentals, setting as a time limit forty minutes. From these papers we saw a dire need for drill on fundamentals.

To meet this need we divide our period of one hour into three distinct parts and devote the first ten minutes to some form of drill. The form varies from day to day. One form, which we feel has been exceedingly valuable, is a series of rapid calculation charts on the four fundamentals which we prepared and had printed. Some charts have all the fundamentals, while others are devoted to one enabling us to meet the need of each individual. The children are most enthusiastic over these and vie with each other and with other classes to get the greatest number of hundreds on a given day.

We use also the mathematical relay race, oral drill and board drill.

After giving these drills from November to February, we gave to all classes the same test given the first day and some classes raised their class average as much as 38 per cent. Every class showed a vast improvement.

Drill then of some type occupies the first ten minutes of every period. The next fifteen minutes are usually devoted to recitation or explanation. Here we give our development lessons or hear classes recite prepared lessons. For the last thirty-five minutes the pupils work at their desks on assigned work to fix that which has been developed. During this time the teacher goes around and helps where help is needed and works with the children as individuals.

I said above that we were working on a definite outline of minimal essentials. As soon as we get what we feel is a fairly complete outline we are planning to attempt to standardize processes along as many lines as possible and then introduce drill exercises to fix each with a hope that it may become as much a part of the child as the multiplication table.

We will use in this standardizing as many short methods as possible for we feel time-saving devices are valuable.

As soon, then, as our working scheme for this part is completed we will attack the problem situation. We are hoping to be able to produce a need in the life of the child and then let the problem work out from that need. Our seventh-grade problems we are building around the home and the eighth-grade around the community.

We are not aiming however to use this phase entirely, for we firmly believe a child can become interested, and needs as well, some work beyond the purely practical. The joy of conquest in the problem world is a large factor in the pupil's intellectual life and must not be overlooked. Moreover not every task in life is a pleasant one and why should all in school be?

To further enrich our course and to develop more thoroughly the mathematical sense we will introduce more extensively next year the equation, formula and some inventional geometry, as well as an extensive use of graphs.

In the ninth grade we have three distinct courses to correspond with the courses pursued in the school, the academic, practical arts and commercial.

The academic work is practically the same for girls and boys and covers the first year of algebra as planned in most high schools. We have used this year a set of charts in algebra which we have prepared for drill work. These mimimal charts are sixteen in number at present and cover the mimimal essentials of algebra. We have aimed to make them so inclusive that we may say when a child has passed all successfully he has at his command the minimum amount of knowledge of the subject and is ready for the sophomore year. These serve as a test to measure the child more definitely, we feel, than the monthly, weekly or topical tests. Here too, all children of all teachers get the same test and it is a better measure for comparative purposes.

The practical arts group includes those pupils who work better with their hands or who will probably leave before completing a full high-school course.

In this group the work for boys and girls is radically different. For both however the time is equally divided between algebra and arithmetic, giving two days a week to each.

The shop work is strongly emphasized. The girls have been making hats and dresses in the shops and they figure to a nicety just how much material they will need, what width is most economical and what kind is best.

In the cooking department the children prepare lunches for the teachers each day and the actual costs are computed by the mathematical department. Problems arising in connection with the buying of materials in both departments are given extensively. They figure costs of meals served in their homes, the number of ounces of protein or carbohydrates, etc., in certain foods and then graph results. Many original problems are made and solved by the girls. The general aim has been to make them able to handle easily the mathematical problems that might arise in the home or shop to which they may go.

The boys of this group have used the mathematics in the general problems of housebuilding as excavating, flooring, the fitting of rafters, joists and sills, the placing of staircases, roofing, plastering, etc. After dealing with each topic the teacher gave as a final problem the drawing of the plan and the computing of the cost of an entire house. The algebra in this group for both girls and boys has treated more practically the equation, formula, and graphs, the idea being to give a background for the algebra of investments which is planned for the senior year for those who stay for a full course or to give those parts of algebra most useful in shops for those who leave to enter the industrial world.

In the commercial department are those who are planning to enter the commercial world. Here, again, the general aim is accuracy and speed. Short methods as applied to business are strongly emphasized. Much work is given in making and reading graphs. Those phases of arithmetic which serve as a foundation for the regular commercial arithmetic are emphasized. Some algebra is given to these students also.

These then are some of the plans of our work but we say again it is still largely experimental and we do not offer it in any sense as a perfected course.

TRENTON HIGH SCHOOL,
TRENTON, N. J.